

WATER AND SANITATION INFRASTRUCTURE FAILURES AND THE MICROBIOLOGICAL AND CHEMICAL SAFETY OF WATER IN A COMMUNITY BORDERING A REGIONAL LANDFILL

Christopher D. Heaney, *Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, USA*

Steve Wing, *Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, USA*

Sacoby M. Wilson, *Institute for Families in Society, University of South Carolina, USA*

Robert L. Campbell, *Rogers-Eubanks Neighborhood Association (RENA), USA*

David Caldwell, *Rogers-Eubanks Neighborhood Association (RENA), USA*

Barbara Hopkins, *Rogers-Eubanks Neighborhood Association (RENA), USA*

Shannon O'Shea, *Department of Environmental Sciences and Engineering, Gillings School of Global Public Health, University of North Carolina, USA*

Karin Yeatts, *Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, USA*

Background and Aims: A historically Black community straddles unincorporated boundaries of two municipalities in Orange County, North Carolina and predates a regional landfill sited along its border. Community members and university partners aimed to investigate long-standing concerns about the microbial and chemical safety of drinking and surface water quality in the community.

Methods: Households in the community were surveyed to collect information about structural signs of well vulnerability (well pump failure; problems with cloudiness, taste, odor; history of well disinfection) and septic system failure (pumping septic tank ≥ 1 per year; a wet yard due to drain-field during non-rainfall periods), and drinking and surface water samples were collected, geo-coded, and analyzed for parameters of microbial and chemical water quality. Relationships between distance to the landfill and concentrations of water quality parameters were evaluated using conditional fixed effects land-use regression models, adjusted for total rainfall in the previous 24 hours.

Results: Of 73 households identified in the community, 27 responded to the survey, and 20 provided drinking water samples. Households reported pervasive signs of well vulnerability (100%) and septic system failure (68%). The microbiological safety of well water was poor compared to public drinking water supplies. Wells exceeded microbiological standards protecting health, whereas public water supplies did not. The presence of volatile organic compounds and heavy metals was also detected in well water supplies. Each 100-meter unit increase in distance from the landfill was associated with a 334 MPN/100 ml decrease in average enterococci concentrations in surface water (95% confidence interval (CI) = -710, 41).

Conclusions: Pervasive private household water and sanitation infrastructure failures were identified, suggesting a need for improved water and sanitation services in this predominantly Black community bordering a regional landfill.